COMITATO PER L'OMOLOGAZIONE
DELLE MACCHINE AGRICOLE

No 687/O.E.C.D.

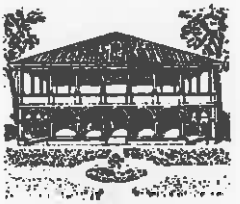
REPORT ON TEST IN ACCORDANCE WITH O.E.C.D.
TEST CODE FOR AGRICULTURAL TRACTORS

FERRARI 95/33



Manufactured by: OFFICINE MECCANICHE FERRARI F. S.p.A.
LUZZARA – REGGIO EMILIA (ITALY)

Date of tests: **September 1979 – September 1980**



CENTRO DI OMOLOGAZIONE DELL'ISTITUTO DI MECCANICA AGRARIA
UNIVERSITA' DEGLI STUDI DI BOLOGNA – ITALIA

This bulletin is based on engineering tests in accordance with the O.E.C.D. STANDARD CODE for the Official Testing of Agricultural Tractors. It does not contain an evaluation of the performance of the tractor on practical work.

This report has been approved by the O.E.C.D. Coordinating Center (C.N.E.E.M.A., France) as being in accordance with the O.E.C.D. STANDARD CODE.

Date of Approval: 31st October 1980

Serial No.: 687

In this report all performance characteristics are given according to the International System of Units and to the Technical System.

Equivalences

Forces:	1 N	= 0.102 kp	or	1 kp	= 9.81	N
Powers:	1 kW	= 1.36 h.p.	or	1 h.p.	= 0.736	kW
Pressures:	1 bar	= 1.02 kp/cm^2	or	1 kp/cm^2	= 0.981	bar
Angular velocity:	1 rad/s	= 9.554 rev/min	or	1 rev/min	= 0.1047	rad/s

FERRARI 95/33 TRACTOR

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Tractor manufacturer:	OFFICINE MECCANICHE FERRARI F. S.p.A. - LUZZARA (Reggio Emilia) - ITALY
Submitted for test by:	Manufacturer
Selected by:	Manufacturer with the agreement of Istituto of Meccanica agraria - University of Bologna
Place of running-in:	OFFICINE MECCANICHE FERRARI F. S.p.A. - LUZZARA
Duration of running-in:	200 hrs for engine, 40 hrs for the tractor

SPECIFICATION OF TRACTOR

Tractor

Make:	OFFICINE MECCANICHE FERRARI F. S.p.A.
Model:	95/33
Type:	Four wheels drive, articuled steering frame
Serial No:	189775

Engine

Make:	LOMBARDINI S.p.A. - Reggio Emilia - Italy
Model:	914
Type:	Four-stroke direct injection Diesel
Serial No:	1730355
Cylinders:	2, verticals, dry, in line; bore 95 mm, stroke 94 mm, total capacity 1332 cm^3; compression ratio 17.8
Valves:	Overhead
Fuel system:	Forced with diaphragm pump CORONA BCD 18999; FIAAM FA 4746 replaceable paper cartridge-type filter; recommended filter change period 300 hrs; BOSCH PFR 2 K 70 (in the test) in line injection pump, or CIPA CPFR 2 K 70 or CONDIESEL CPF 2 R 70; manufacturer's production setting for injection pump 41-44 mm^3 for stroke at 3000 rev/min of full load engine; OMAP OLL 160 (in the test) or CIPA VH 160 or BOSCH DLLA 14 injection nozzles, injection pressure 196-206 bar; advanced admission: 27° (fly wheel measured); capacity of fuel tank 16 l
Governor:	LOMBARDINI mechanical type with centrifugal weights governed range of engine speeds 1000 + 3200 rev/min; rated engine speed 3000 rev/min

Air cleaner:	LOMBARDINI 9043702-55 oil filter with cyclone pre-cleaner; oil capacity 0.4 l; flow 2000 l/min at 3000 rev/min
Lubrication system:	LOMBARDINI forced feed from lobe type pump: sieve filter in suction and paper cartridge replaceable filter FIAAM FT 4756 at delivery; oil capacity 3.0 l; recommended oil change period 100 hrs; recommended filter change period 200 hrs; recommended oil: AGIP F1 DIESEL SIGMA SAE 40 (summer) and SAE 20 or 10 (winter),or another conforming to MIL-L 2104 Supp. 1
Cooling system:	Air forced with 10 blades flywheel axial impeller; flywheel diameter 189.5 mm; flow 1500 m^3/h at 3000 rev/min of engine
Starting system:	Electric, BOSCH starting motor type GF 0.001.314.001 solenoid engaged type, 12 V, 1.1 kW motor; low temperature starting aid: manual operated fuel supplementary ratio device on injection pump
Exhaust silencer:	LOMBARDINI DGM-SA 553; single chamber expansion tipe silencer; 120 x 70 mm oval, 473 mm long; motor left side located, lateral discarge, mouth 350 mm above ground
Electrical equipement:	12 V, DUCATI 4035025100 alternator, 0.25 kW; one battery, capacity 55 Ah at 20 hours rating; lead acid type

Transmission

Clutch:	VALEO 180 DBRF335DAN - PS 2709, single dry plate type, plate diameter 180 mm; driving both gear box and p.t.o.; pedal operated
Gear box:	Own make, mechanical with sliding gears operated by two hand levers. Nine speeds are obtained by selecting the range (low, high, reverse) and then the speed (1st, 2nd, 3rd)
Front and rear axles and final transmission:	Own make; differential operated by bevel gear (ratio 1:5.286) and final drives (ratio 1:5.100). Hand operated differential lock, automatic desengaging on the front axle. The front and rear axles are couples by an universal joint and is costantly mechanically connected
Oil capacities:	Gear box, front transmission and hydraulic system: 14 l rear transmission: 8 l
Oil change period:	500 working hrs
Recommended oil qualities:	Gear box, front transmission and hydraulic system: AGIP FI ROTRA HY SAE 80 or another conforming to MIL-L 2105 B - Viscosity SAE 80W; rear transmission: MACH GR 280 XP or another conforming to 220 ISO EP

Total ratios and speeds

Gear	No of engine revolutions for one revolution of driving wheels	Theoretical travelling speed for 3000 rev/min rated speeds of engine	
		m/s	km/h
1st lower	307.352	0.36	1.31
2nd lower	154.585	0.73	2.61
3rd lower	86.689	1.29	4.66
1st high	58.407	1.92	6.91
2nd high	29.376	3.82	13.74
3rd high	16.473	6.80	24.50
1st reverse	198.875	0.56	2.03
2nd reverse	100.025	1.12	4.03
3rd reverse	56.092	2.00	7.19

Calculated with the tyre rolling circumference of 2240 mm in accordance to tyre manufacturer's specification

Power take-off (Non indipendent)

Main p.t.o.: Located at the rear of tractor, central position;
height above ground 310 mm;
dimensions 34.8x27.9x8.6 mm (1.3/8", ISO R 500), 6 splines;
hand lever engaged.

Speeds proportional at engine speed:
two, 653 or 1007 rev/min at 3000 rev/min rated engine speed;
2480 or 1608 rev/min of engine at p.t.o. 540 rev/min
Direction of rotation, clockwise viewed from tractor rear.

Speeds proportional to travelling speed:
one, one p.t.o. revolution for 0.087 m;
27 p.t.o. rev/min for one revolution of driving wheels.
Direction of rotation, clockwise viewed from tractor rear.

Power lift: Own make;
integral hydraulic system floating position, no controls;
one single acting cylinder, 70 mm bore, 125 mm stroke;
useful cross area 25.9 cm^2;
HIDROIRMA AM 1,5/145 hydraulic gear pump directly driven by engine, suction in carter of gear box and front axles.
Paper cartridge replaceable filter MP MPS50/25/S.
No external tappings;
maximum pressure 100 bar;
oil capacity 14 l (see front axle);
recommended oil: (see front axle);
recommended oil change period: (see front axle)

Three point linkage: In special non unificated construction (cat. 1.N - proposal ISO, tab. 730 II);
balls of link according to ISO I cat.;
only linkage geometry.
Lift rods lenght: 570 mm;
lift height above ground adjustable from 275 to 650 mm

Trailer hitch: Own make;
height above ground 300 or 530 mm;
adjustable by shifting hitch;
diameter of clevis hole 28 mm;
distance to rear axle centre 300 mm;
distance referred to the main p.t.o. - shaft:
horizontal 100 mm, vertical 2 position, 210 or 35 mm (under)

Steering: Own make;
mechanical type working on centre, pivot of the tractor by mean of: steering wheels, worm gear box, connecting rod;
optional: hydraulic steering

Brake: Own make;
foot brakes: mechanically operated internal shoe type acting on two brake drums in the front wheels;
parking brake: operated by hand lever with ratchet lock in position the foot brakes

Drive wheels: In front and rear.
4 radial tyres 7.50-16, 4 ply rating pneumatic;
maximum permissible weight on each tyre 490 kp at 1.3 bar internal air pressure;
track width 760 or 950 mm, changeable by turning wheels rims;
wheelbase: 1110 mm

Masses: With full fuel tank, oil

Masses kg	No driver			With driver		
	on front wheels	on rear wheels	total	on front wheels	on rear wheels	total
Without additional weight (none fitted)	505	265	770	520	325	845

Seat: Own make;
spring-mounted with cushion;
range of adjustement: two position with 25 mm of fore and aft deplacement tractor, no vertical adjustement

Number of grease points: (whole tractor) 15

Overall dimensions:	Lenght	2.49 m (with three points linkage 2.85 m)
	width	0.95 m at minimum trackwidth; 1.15 m at maximum trackwidth
	height	1.12 m (to top of steering wheel)
	maximum ground clearance 0.240 m (below trailer hitch)	
Lighting:	In accordance with italian standard	

	Height above ground of centre cm	Dimensions cm	Distance of centre from outside edge of tractor cm
eadlights	87.5	14 x 9	35.5 (1)
Side lights	78.0	5 x10	19.0 (1)
Rear lights	78.0	5 x10	14.5 (1)
Reflectors	67.0	6	12.0 (1)

(1) With track width of 0.950 m

FUEL AND LUBRICANTS USED IN TEST

Fuel:	Agricultural Diesel oil; density 15°C: 0.825 kg/l cetane number: 69
Engine oil:	AGIP DIESEL SIGMA viscosity SAE 40W conforming to MIL-L 2104 Supp. I
Gear box, front axle and hydraulic system:	AGIP F1 ROTRA HY viscosity SAE 80W conforming to MIL-L 2105 B
Rear axle:	MACH GR 280 XP conforming to 220 ISO EP

COMPULSORY TEST

1) MAIN POWER TAKE-OFF PERFORMANCE

Date and location of test: 24th September 1980 - Experimental Centre of Cadriano - University of Bologna

Type of dynamometer: Electrical, type I.M.A. Bo 65

Power	Speed		Fuel consumption		Specific energy
	engine	p.t.o.	hourly	specific	
kW	rev/min	rev/min	l/h	kg/kWh	kWh/l
AT MAXIMUM POWER 2-HOURS TEST					
20.51	3000	653	7.40	0.298	2.77
AT THE SPEED RECOMMENDED BY THE MANUFACTURER FOR DRAWBAR WORK					
20.51	3000	653	7.40	0.298	2.77
PART LOADS AT MAXIMUM POWER					
I) 85% of the torque at maximum power					
17.85	3072	669	6.10	0.282	2.93
II) Unloaded					
—	3238	705	1.92	—	—
III) 50% of the load defined in (I)					
9.29	3201	697	3.82	0.339	2.43
IV) Maximum power					
20.51	3000	653	7.40	0.298	2.77
V) 25% of the load defined in (I)					
4.69	3224	702	2.73	0.480	1.72
VI) 75% of the load defined in (I)					
13.84	3178	692	4.95	0.295	2.80

Power kW	Speed		Fuel consumption		Specific energy kWh/l
	engine rev/min	p.t.o. rev/min	hourly l/h	.specific kg/kWh	
PART LOAD AT STANDARD SPEED OF p.t.o.					
I) 85% of the torque at maximum power					
15.69	2531	551	5.04	0.265	3.11
II) Unloaded					
—	2678	583	1.40	—	—
III) 50% of the load defined in (I)					
8.10	2613	569	3.01	0.307	2.69
IV) Maximum power					
18.10	2480	540	6.25	0.285	2.90
V) 25% of the load defined in (I)					
4.11	2650	577	1.94	0.389	2.12
VI) 75% of the load defined in (I)					
12.08	2599	566	4.03	0.275	3.00

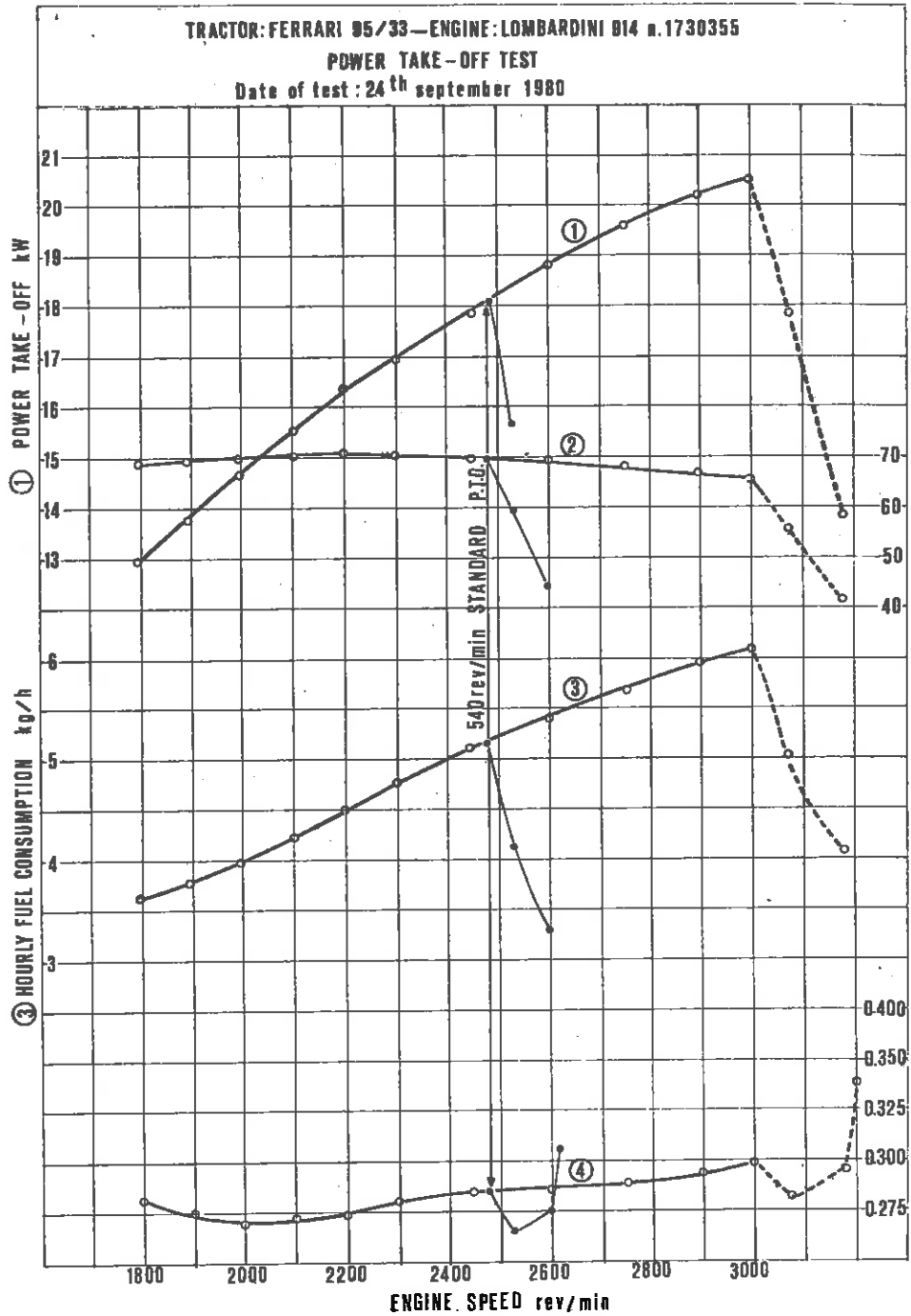
SPECIFIC STANDARD FUEL CONSUMPTION: 0.282 - 0.339 - 0.265 - 0.307 kg/kWh

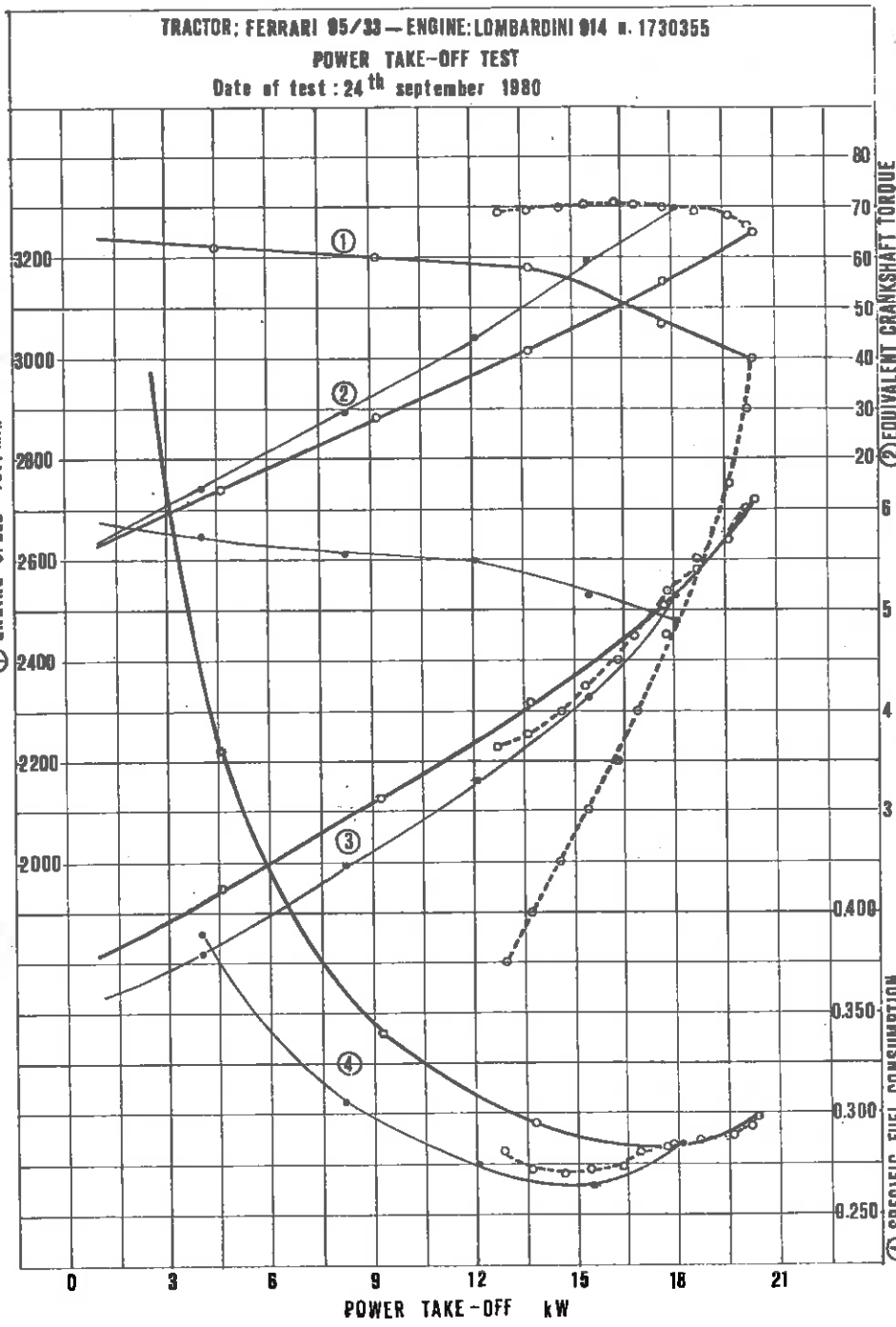
No load maximum engine speed: 3239 rev/min

Equivalent crankshaft torque at maximum power: 65.3 mN

Maximum equivalent crankshaft torque: 70.8 mN at 2200 rev/min of the engine

Mean atmospheric conditions:	temperature	22.0	°C
	pressure	101.300	Pascal
	relative umidity	65	%
Maximum temperature:	coolant	115	°C
	engine oil	112	°C
	fuel	28	°C


TRACTOR: FERRARI 95/33 — ENGINE: LOMBARDINI 914 n.1730355
POWER TAKE-OFF TEST
Date of test: 24th september 1980
① POWER TAKE-OFF kW
② EQUIVALENT CRANKSHAFT TORQUE N.m
③ HOURLY FUEL CONSUMPTION kg/h
④ SPECIFIC FUEL CONSUMPTION g/kWh
540 rev/min STANDARD P.T.O.
ENGINE SPEED rev/min
1800
2000
2200
2400
2600
2800
3000
21
20
19
18
17
16
15
14
13
6
5
4
3
70
60
50
40
0.400
0.350
0.325
0.300
0.275


TRACTOR; FERRARI 95/33 — ENGINE: LOMBARDINI 914 n. 1730355
POWER TAKE-OFF TEST
Date of test : 24 th september 1980
① ENGINE SPEED rev/min
3200
3000
2800
2600
2400
2200
2000
② EQUIVALENT CRANKSHAFT TORQUE m.N
80
70
60
50
40
30
20
③ HOURLY FUEL CONSUMPTION kg/h
6
5
4
3
④ SPECIFIC FUEL CONSUMPTION kg / kWh
0.400
0.350
0.300
0.250
0
3
6
9
12
15
18
21
POWER TAKE-OFF kW

2) DRAWBAR PERFORMANCE

Date of test: 20th - 21th September 1979

Type of track: concrete

Gear	Speed km/h	Power kW	Drawbar pull N	Engine speed rev/min	Slip of wheels %	Drawbar fuel consumption kWh/l
i) Maximum power						
1st l	1.25	2.79	8045	3205	15.0	1.26
2nd l	2.44	5.38	7945	3165	14.7	1.78
3rd l	4.39	9.68	7945	3200	15.0	2.46
1st h	6.48	14.29	7945	3170	15.0	2.59
2nd h	13.38	18.95	5100	2980	5.8	2.67
3rd h	24.90	16.95	2450	3000	2.2	2.56
ii) Five hour test at 75% of pull at maximum power						
1st h	6.72	11.12	5960	3150	7.7	2.64
iii) Five hour test at pull corresponding to 15% wheelslip in test i)						
1st h	6.61	14.77	8045	3150	9.2	2.47

Oil consumption during ten hours duration of tests ii) and iii): 16 g/h

Test iii) was carried out with 200 kg over ballast

Tyres inflation pressure: 1.3 bar (front and rear)

Height of drawbar above ground: 300 mm

Drawbar fuel consumption kg/kWh	Temperatures °C			Atmospheric conditions		
	Fuel	Coolant	Engine oil	Temperature °C	Relative umidity %	Pressure bar
0.656	23	65	75	24	52	1.019
0.463	23	66	79	24	54	1.019
0.336	24	70	78	24	56	1.019
0.318	24	80	82	25	54	1.019
0.309	25	112	88	25	52	1.019
0.332	25	108	84	25	50	1.019
0.312	23	76	92	25	58	1.017
0.334	23	98	110	26	60	1.017

3) TURNING SPACE AND TURNING CIRCLE

Details of wheels equipment: front and rear 7.50-16, 4 p.r. pneumatic; track width, front and rear axles, 760 mm

	Without brakes	
	right hand	left hand
Radius of turning space, m	3.10	3.10
Radius of turning circle, m	3.00	3.00

No "with brakes" test has been carried out since tractor is not provvided with steering brakes

4) LOCATION OF CENTRE OF GRAVITY

- Height above ground	490 mm
- Distance forward from the vertical plane containing the axis of the rear wheels	683 mm
- Distance of the median plane of the tractor to the right hand side	0 mm

5) BRAKING PERFORMANCE

Date of test:	8th October 1979
Type of track:	Concrete
Type of decelerometer:	Moto Meter, at maximum, recorder
Masse of tractor:	845 kg, with driver

A) Foot brake

Cold brakes

Travelling speed	km/h	25.0
Deceleration	m/s^2	7.5
Stopping distance	m	3.8
Force on pedal	N	280
Force on pedal for maximum deceleration of 2.5 m/s^2	N	50

Brake fade characteristics (hot tests)

Deceleration	hot/cold	%	87
Stopping distance	cold/hot	%	63
Force on pedal	hot/cold	%	107

B) Park brake

Tractor facing up slope (16%):
Pull on hand brake 200 N, tractor does not roll

Tractor facing down slope (16%):
Pull on hand brake 200 N, tractor does not roll

6) AMBIENT NOISE EMITTED BY THE TRACTOR

Date of test: 19th September 1979
Type of track: Concrete
Type of sound level meter: Brüel and Kjaer, type 2209

Results of test

Gear	3rd	h
Maximum travelling speed:	26.1	km/h
Travelling speed before acceleration:	19.6	km/h
Sound level:	92.0	dB(A)

7) NOISE AT THE DRIVER'S EAR LEVEL

Date of test: 20th September 1979
Type of track: Concrete
Type of sound level meter: Brüel and Kjaer, type 2209
Type of frequency analyser: Brüel and Kjaer, type 1613

No cab or safety frame fitted on tractor

Results of test

Gear	Drawbar pull at which the tractor develops the maximum sound level N	Travelling speed km/h		Sound level	
		nominal	effective	dB(A)	Sones
1st h*	7750	6.91	6.50	97.4	120.7

* The 1st h gear corresponds to the travelling speed nearest to 7.25 km/h

8) POWER LIFT PERFORMANCE

Date and location of test:	11th April 1980 - Experimental Centre of Cadriano
Hydraulic fluid:	AGIP F1 ROTRA HY, SAE 80W
Type of linkage lok for transport:	Hydraulic
Opening pressure of the cylinder over pressure relief valve:	105 bar

Hydraulic pump

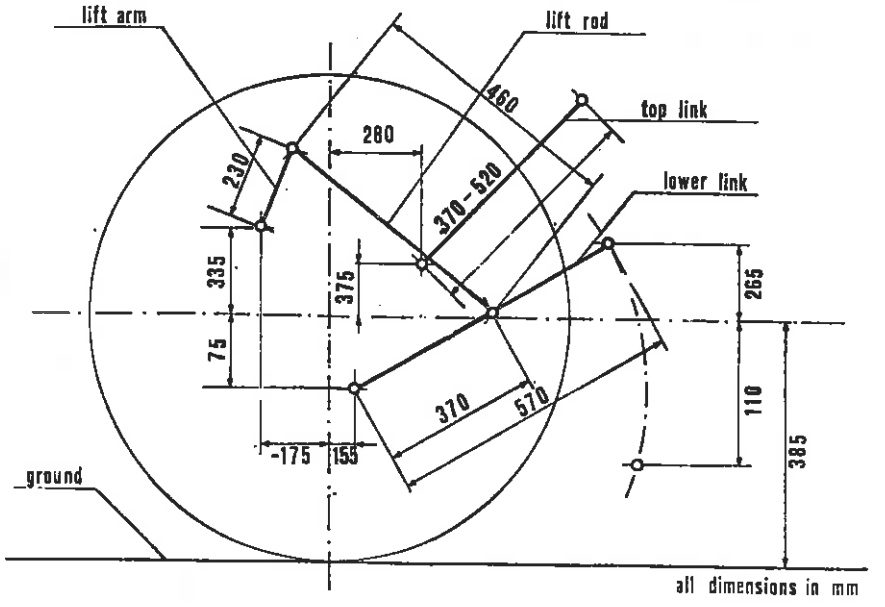
i) Opening pressure of relief valve: 105 bar
Sustained pressure by open relief valve: 103 bar

ii) Pump delivery rate at minimum pressure and maximum engine speed: 10.1 l/min

iii) Pump delivery rate: 9.0 l/min
Delivery pressure: 98 bar
Hydraulic power: 1.47 kW

Power lift

Dimensions of implement linkage for the table on page 18



Linkage geometry

Projected length in side view

lower links,	mm	570
lift arms,	mm	230
lift rods,	mm	440
top link,	mm	370–520

Distance of lift rod connection point from pivot point of lower link,	mm	370

The following dimensions are given relative to the rear wheel centre line, situated 385 mm above the ground level

Lower link pivot points	mm	156 behind,	75 below
Top link pivot point	mm	280 behind,	375 above
Lift arm pivot points	mm	177 behind,	335 above
Maximum and minimum height of lower link hitch points	mm	265 above,	110 below
Height of lower link hitch points when locked in transport position	mm	500 above,	—

Lifting forces

Lifting heights in relation to a horizontal line through the lower link pivoting point, cm	- 3.5	0	+ 5	+ 10	+ 15	+ 20	+ 25	+ 30	+ 34
Lifting force (N) at the hitch points N	9320	9900	10140	10490	10490	10950	11650	12120	10490
Values for the pressure at maximum hydraulic horsepower (98 bar), calculated from measurement made at maximum pressure (103 bar)	Maximum force exerted throught whole range 9320 N Force at wich front of tractor is calculed to lift 7575 N								

The standard test frame cannot be fitted because of the special construction of the implement linkage (Cat. 1N - Prop. ISO Tab. 750/II)

Bologna, September 1980

TEST ENGINEER

Dr.Agr. A. Marocchi

HEAD OF TRACTOR TEST CENTER

Prof. Dr. G. Casini-Ropa

DIRECTOR OF ISTITUTO OF
MECCANICA AGRARIA
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Prof.Ing. E. Manfredi